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DATA FROM GEOTHERMAL WELLS NEAR OASIS, LOWER COACHELLA VALLEY, CALLIFORNIA

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DATA FROM GEOTHERMAL GRADIENT WELLS NEAR OASIS, LOWER COACHELLA VALLEY, CALIFORNIA

By

J. H. Robison

EXPLANATION OF THE DATA

This report includes drillers' logs, temperature logs, and water quality analyses from geothermal tests made at 11 sites near Oasis, lower Coachella Valley, California. The wells were drilled in 1978 under contract to the U.S. Geological Survey as part of an appraisal of geothermal resources in the lower Coachella Valley.

Locations of the wells are shown on a map (figure 1); the location-numbering system for wells is shown on figure 2.

The drillers' logs are based on examination of well cuttings, supported by electric and gamma ray logs. Temperature logs of wells CV-1 through CV-8 were plotted from measurements at depth intervals of about 3 m, using a thermistor probe and precision ohmmeter that yielded an accuracy of about $\pm$ 0.1°C and a precision of 0.01°C. Temperature measurements in wells CV-9 through CV-11 were made with a truck-mounted wireline logger using a thermistor probe and continuous recording equipment; bottom-hole measurements with the precision system were used to calibrate the continuous logs to an accuracy of about $\pm$ 0.2°C.

Samples of formation water were obtained by pumping or letting the wells flow. Chemical analyses of the water are reported in table 2. Wells completed with blank pipe are indicated by an "H" in the informal number (CV-1H); wells completed with a well screen at the end of small-diameter casing are indicated by a "P" in the informal designation (CV-1P).

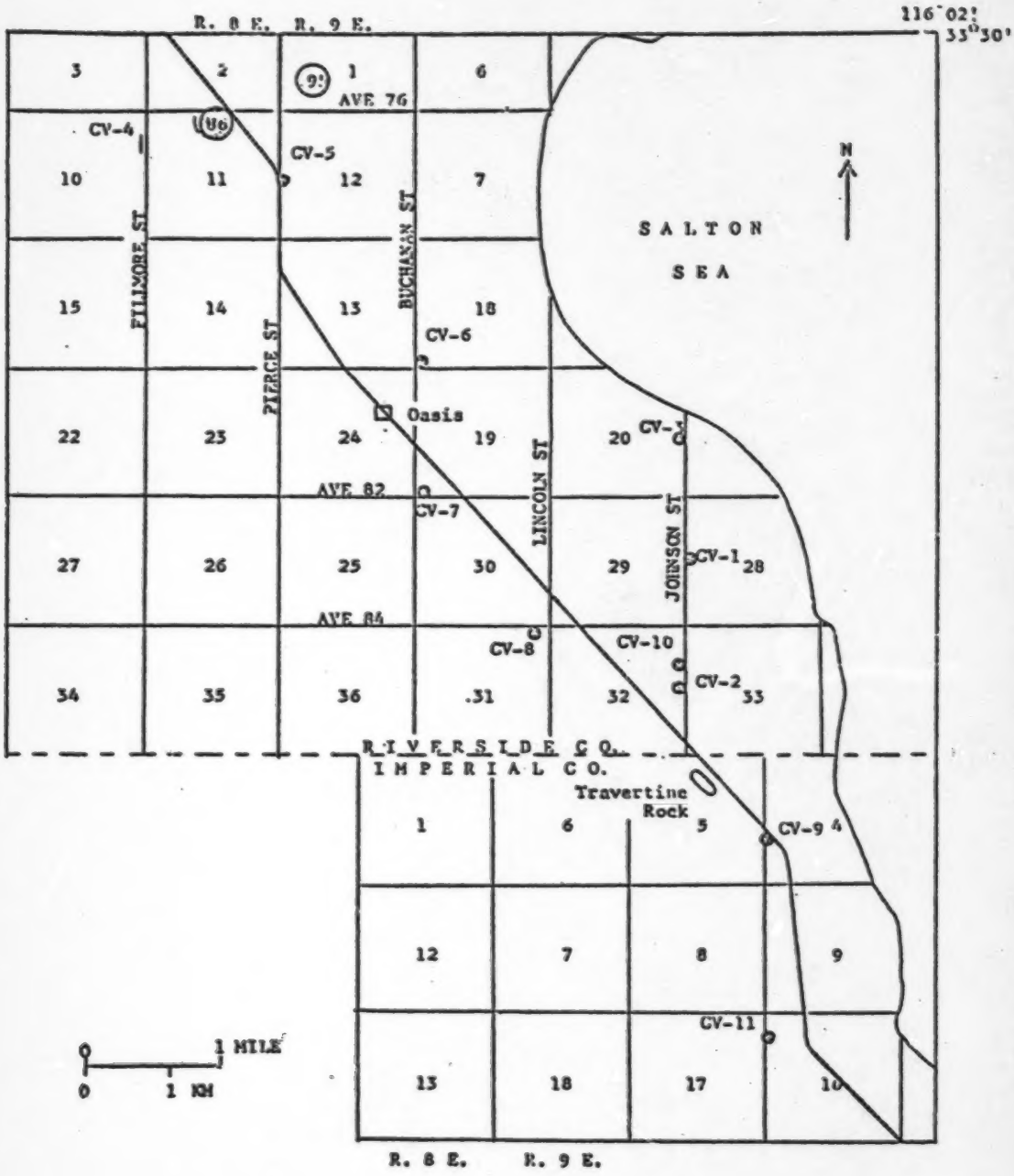

Figure 1. — Map of Oasis area showing locations of geothermal gradient holes

Figure 2. — Diagram of well-numbering system

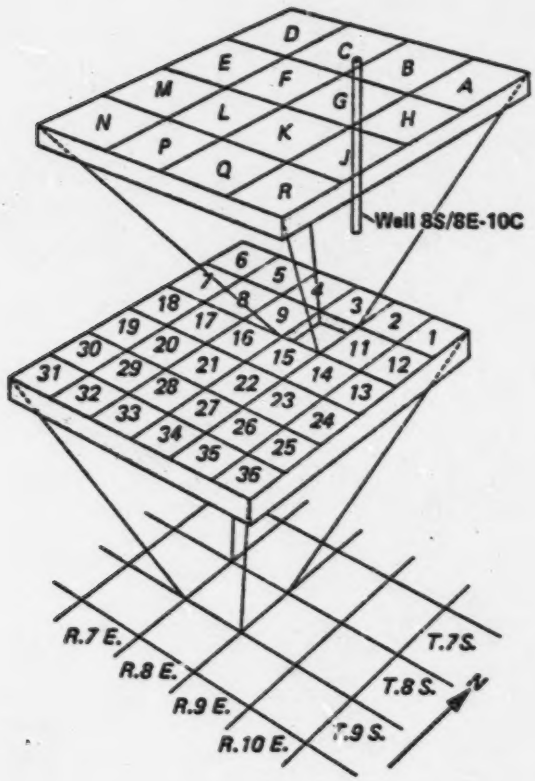

Figure 3. -- Graph of temperature measurements in well CV-1.

CV-1H 8S/9E-28E 33°26'54" N., 116°03'32" W.

Temperature measurements Nov. 1, 1978 by J.Robison & R.Craig

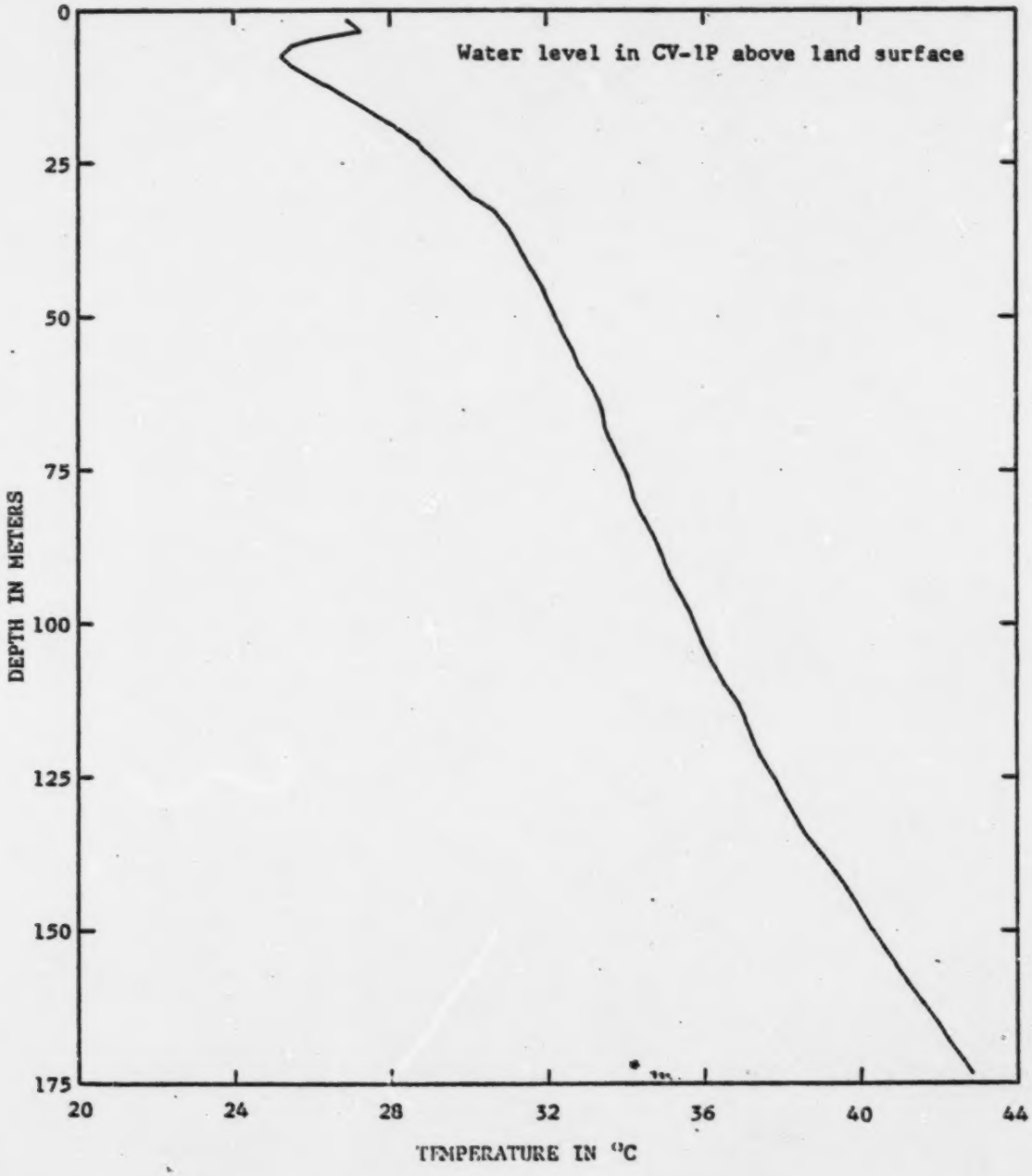

Figure 4. -- Graph of temperature measurements in well CV-2.

CV-2P 8S/9E-32H 33°26'01" N., 116°03'38" W.

Temperature measurements Nov. 1, 1978 by J.Robison & R.Craig

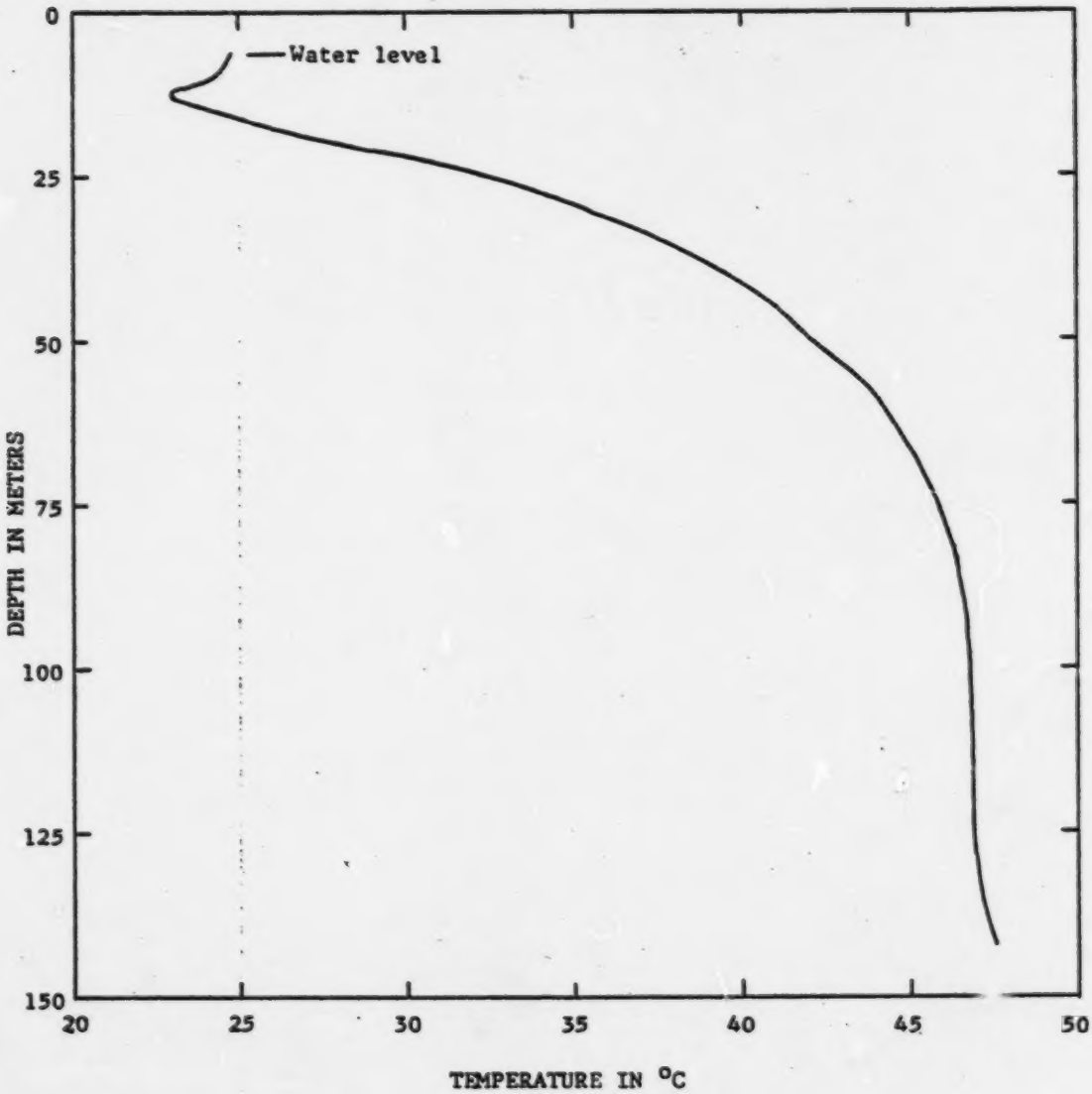

Figure 5 -- Graph of temperature measurements in well CV-3.

CV-3H 8S/9E-20J 33°27'44" W., 116°03'38" W.

Temperature measurements Oct. 31, 1978 by J.Robison & R.Craig

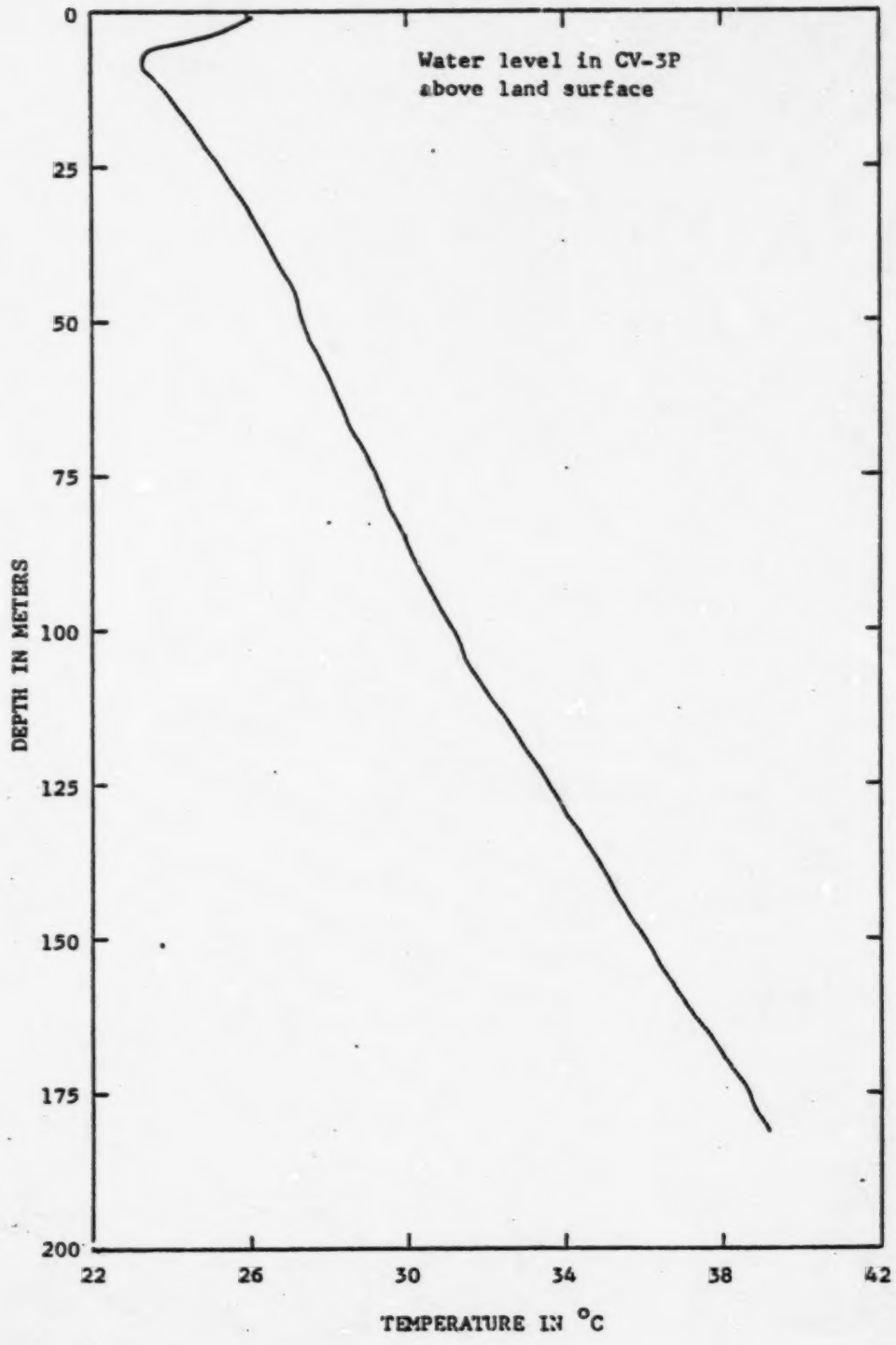

Figure 6 -- Graph of temperature measurements in well CV-4.

CV-4P 8S/8E-10C 35°29'16" N., 116°08'30" W.

Temperature measurements Nov. 2, 1978 by J. Robison & R. Craig

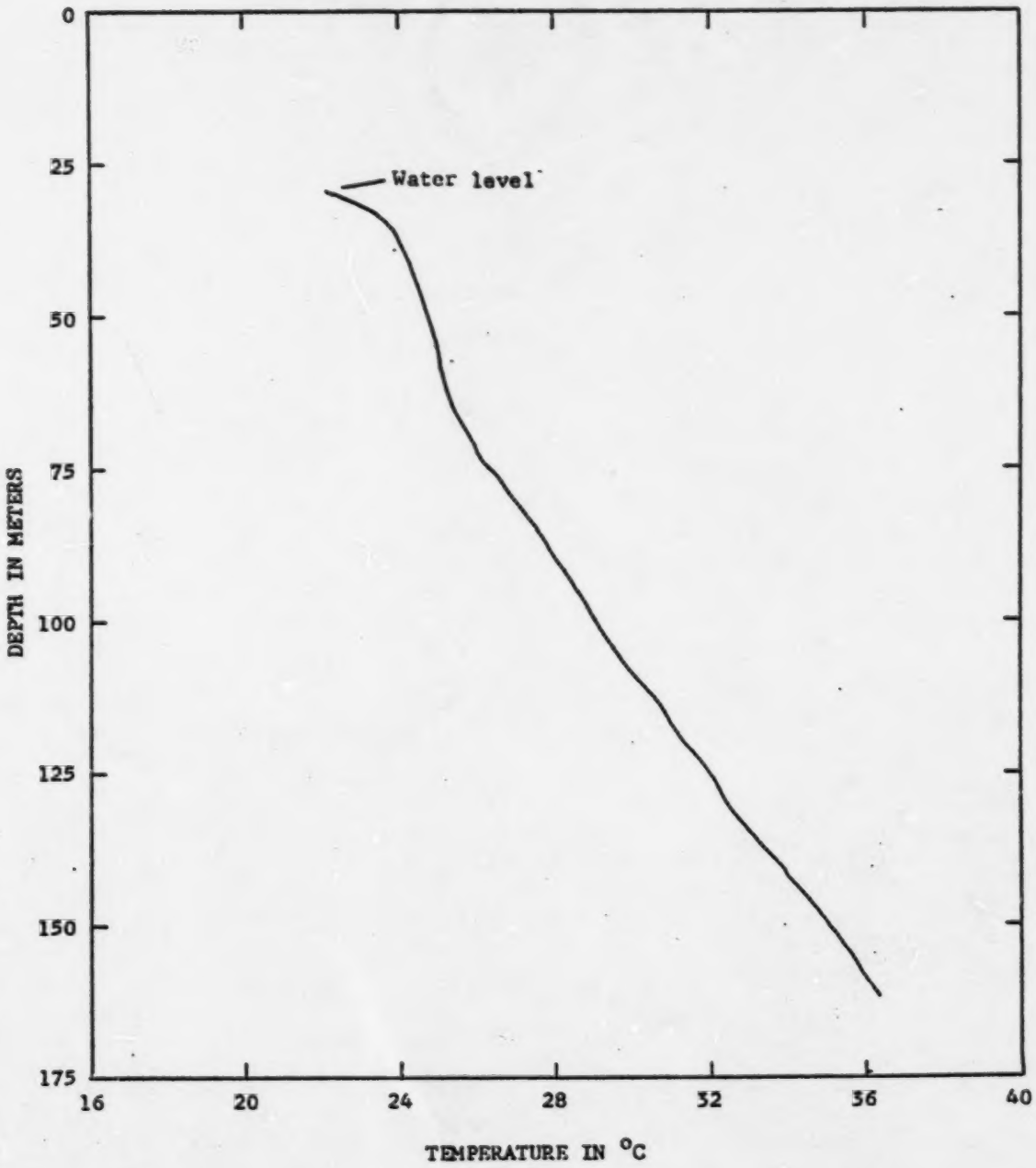

Figure 7 -- Graph of temperature measurements in well CV-5.

CV-5P 8S/3E-12M 33°29'29" N., 116°06'41" W.

Temperature measurements Oct. 31, 1978 by J.Robison & R.Craig

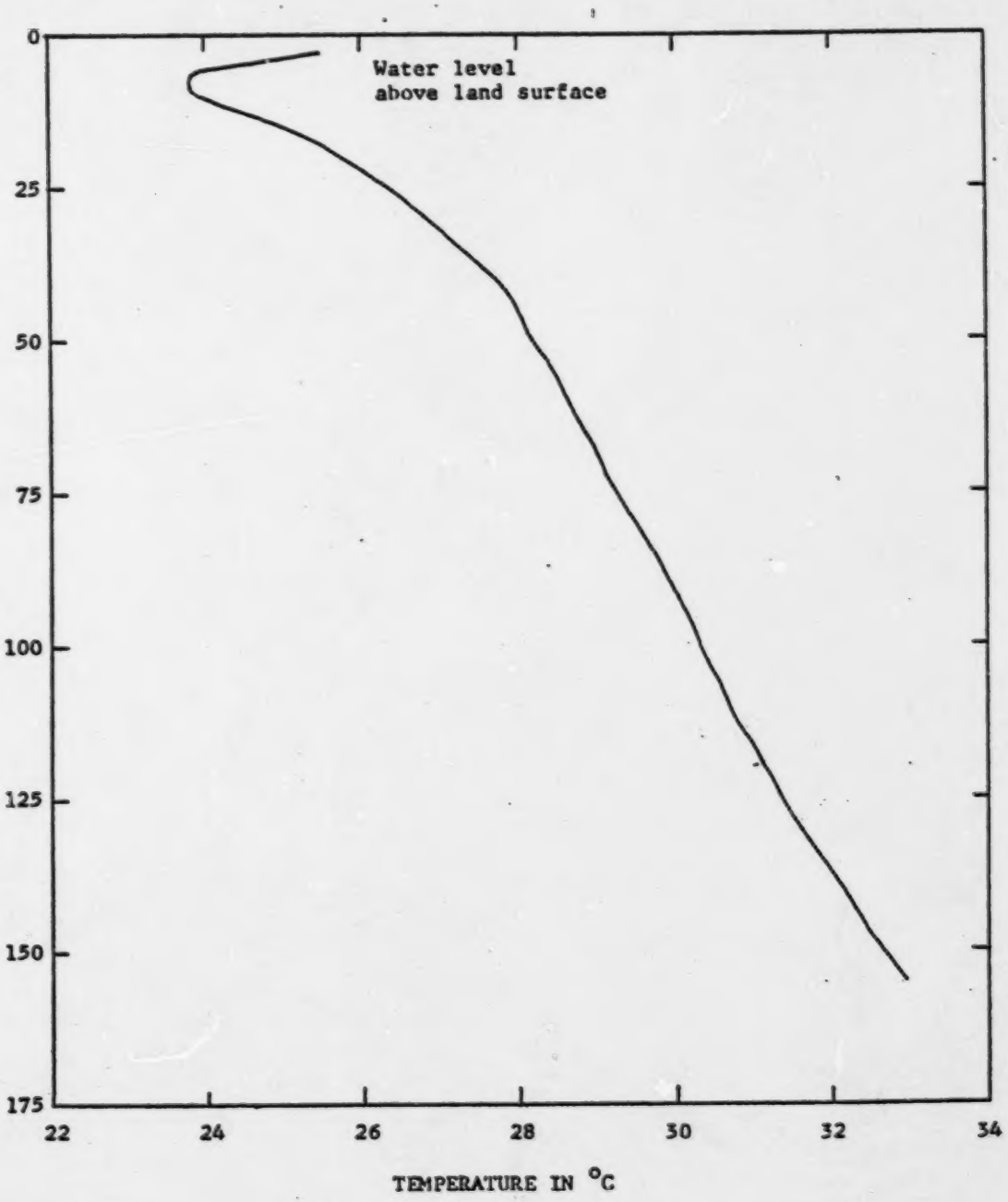

Figure 8 -- Graph of temperature measurements in well CV-6.

CV-6H 8S/9E-18N 33°28'13" N., 116°05'38" W.

Temperature measurements Oct. 31, 1978 by J.Robison & R.Craig

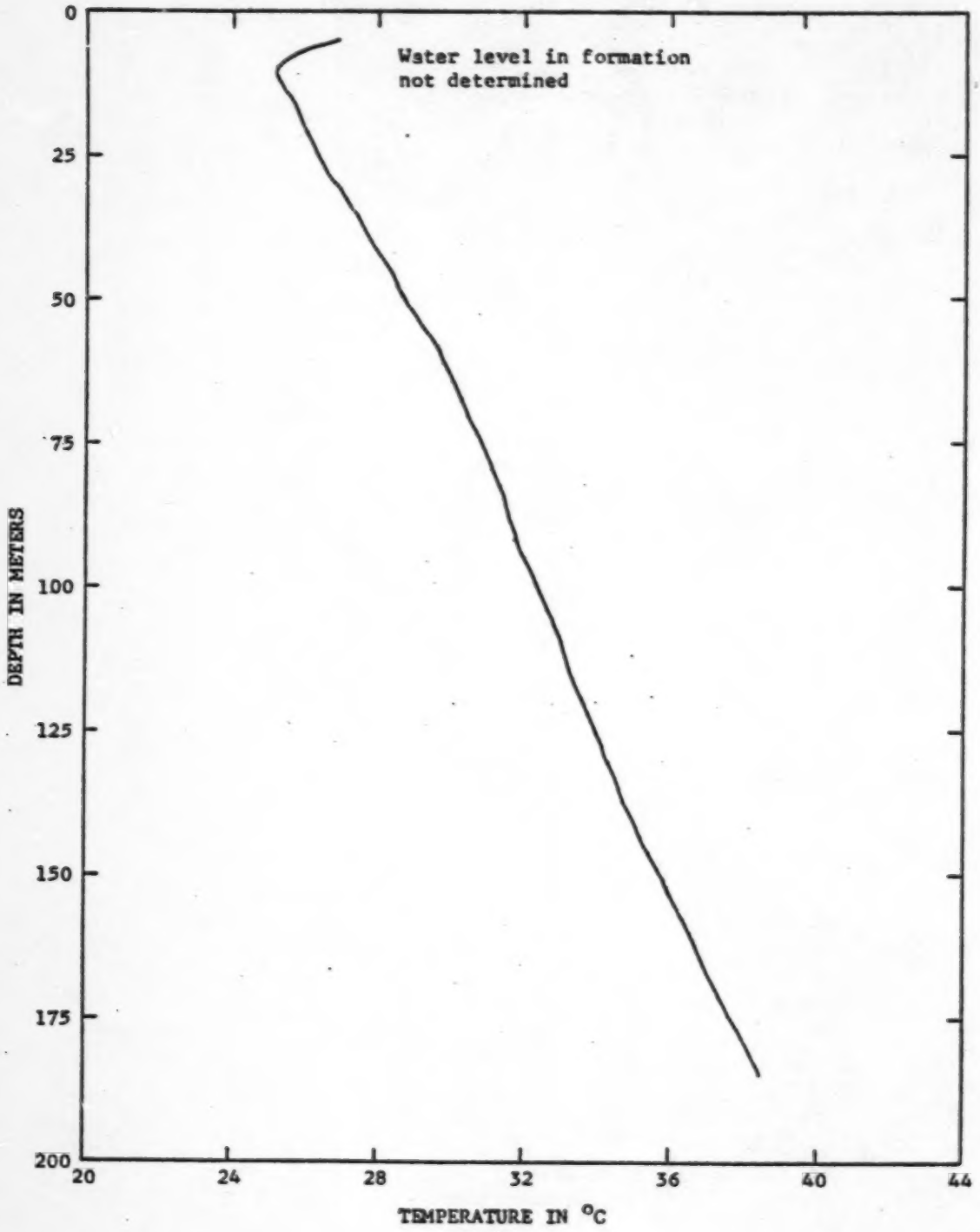

Figure 9 -- Graph of temperature measurements in well CV-7.

CV-7P 8S/9E-19N 33°27'20" N., 116°05'37" W.

Temperature measurements Nov. 2, 1978 by J.Robison & R. Craig

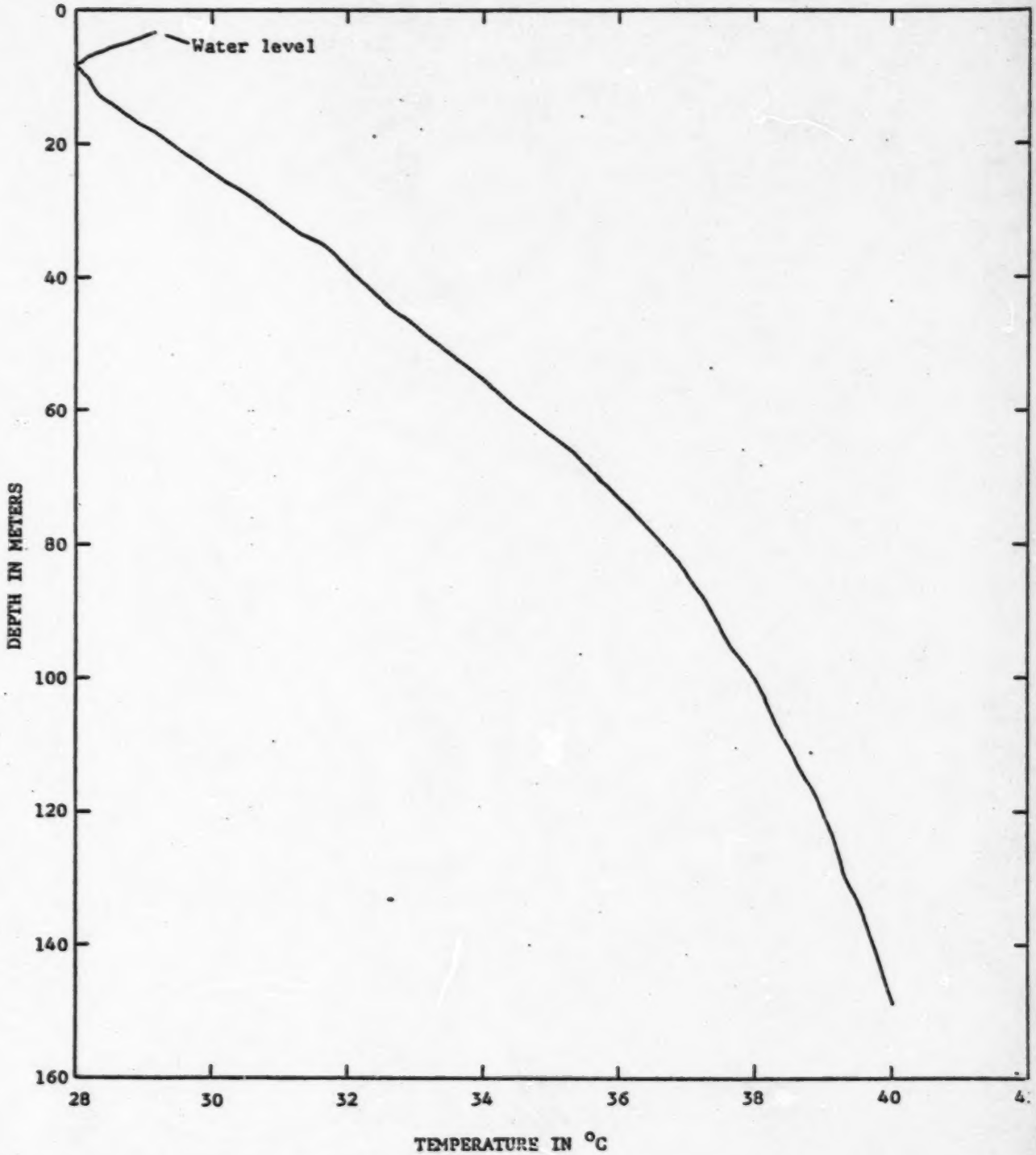

Figure 10 -- Graph of temperature measurements in well CV-8.

CV-8H 8S/9E-31A 33°26'24" N., 116°04'45" W.

Temperature measurements Nov., 1978

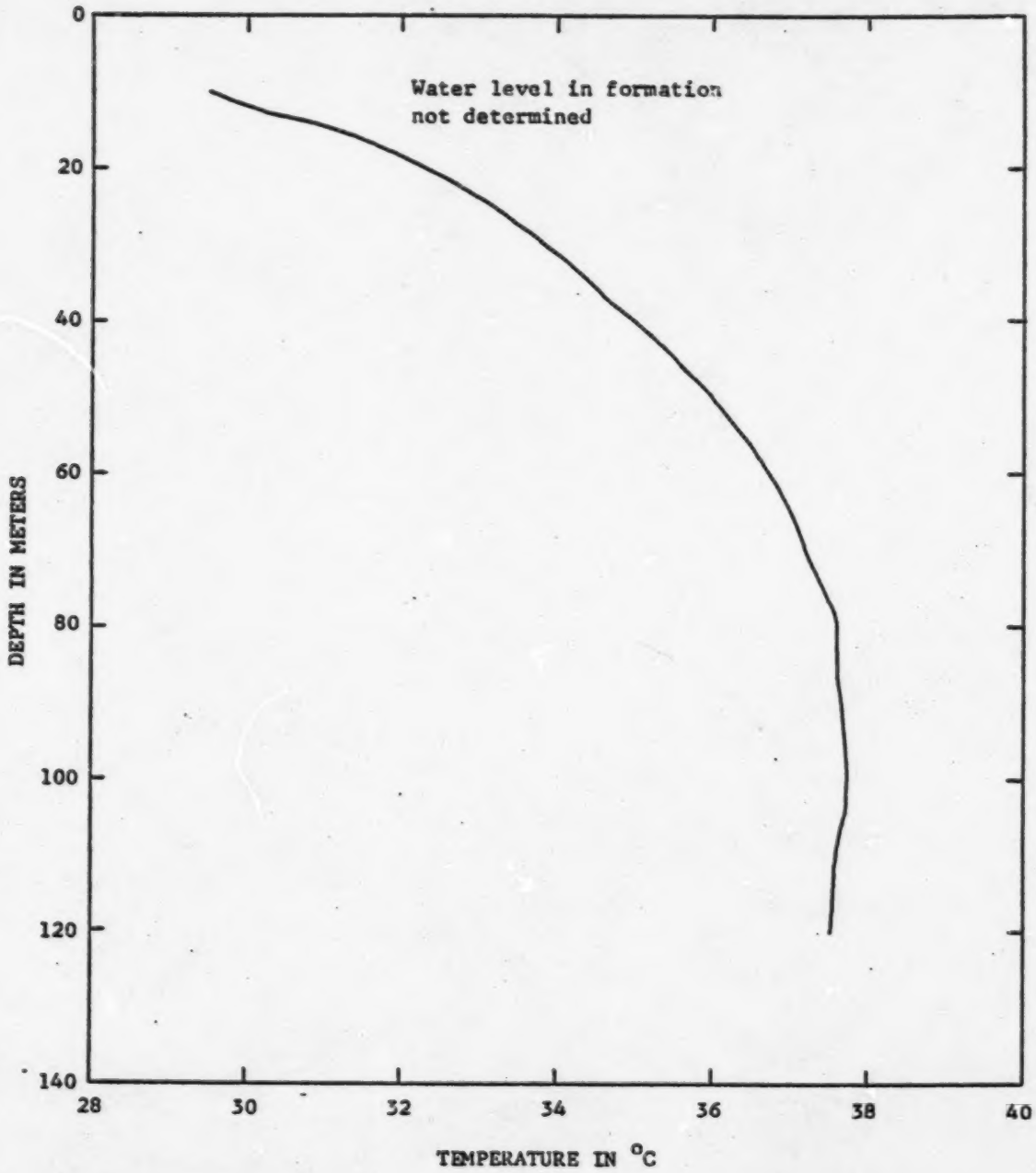

Figure 11 -- Graph of temperature measurements in well CV-9.

CV-9P 9S/9E-4M 33°25'01" N., 116°02'57" W.

Temperature measurements Mar. 21, 1979

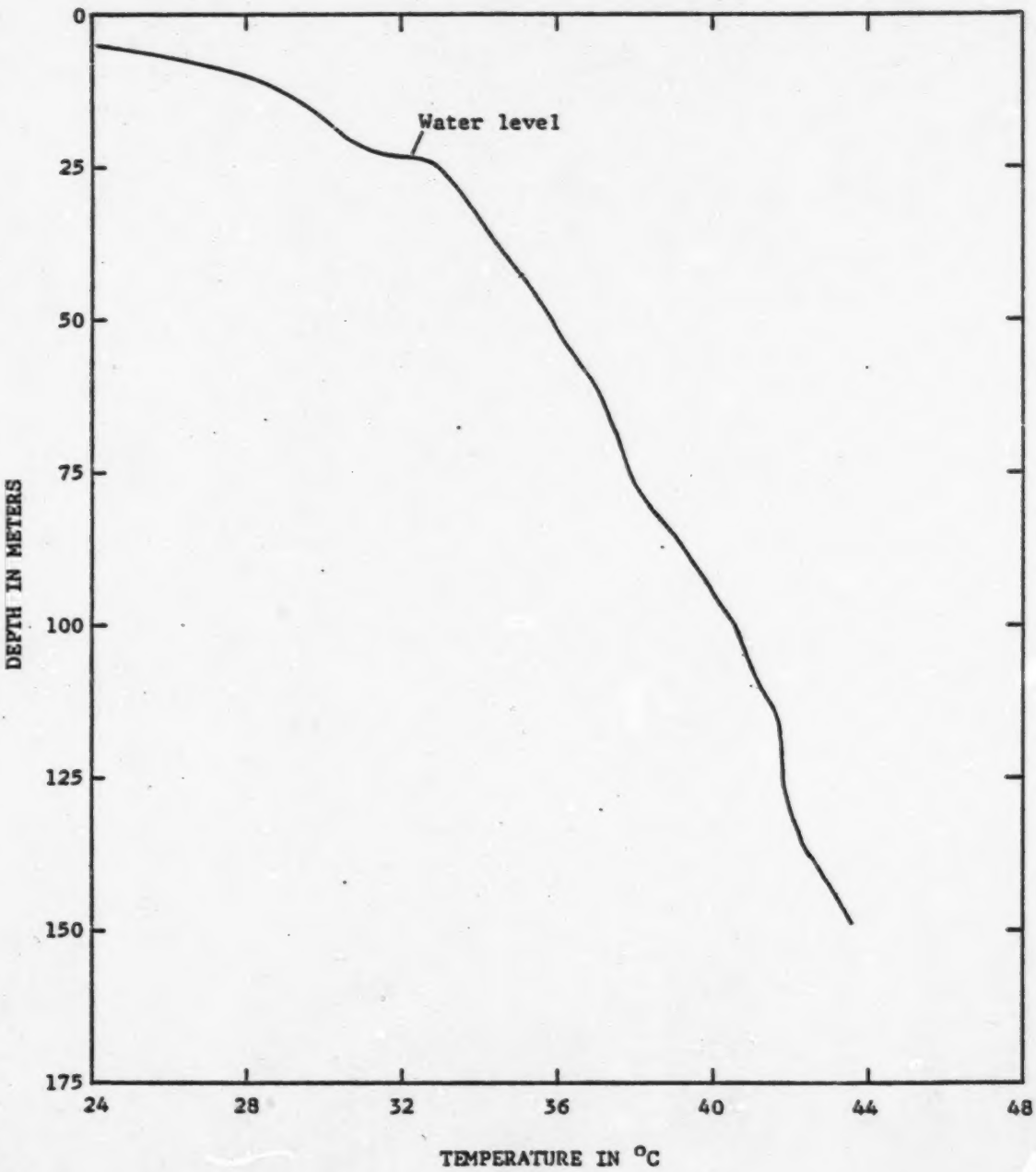

Figure 12 -- Graph of temperature measurements in well CV-10.

CV-10P 8S/9E-32H 33°26'13" N., 116°03'39" W.

Temperature measurements Mar. 21, 1979

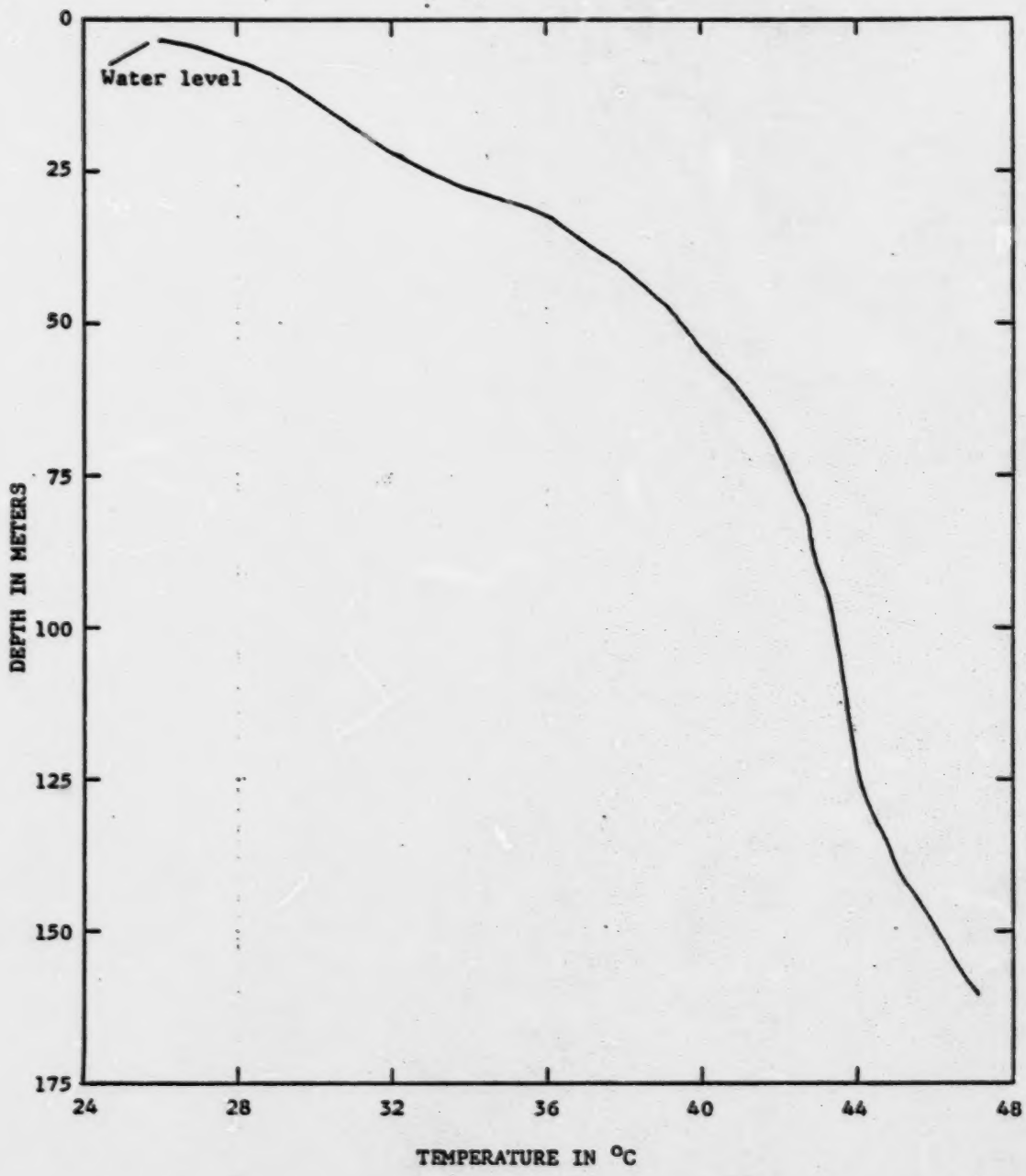

Figure 13 -- Graph of temperature measurements in well CV-11.

CV-11H 9S/9E-16D 33°23'38" N., 116°02'58" W.

Temperature measurements Mar. 20, 1979

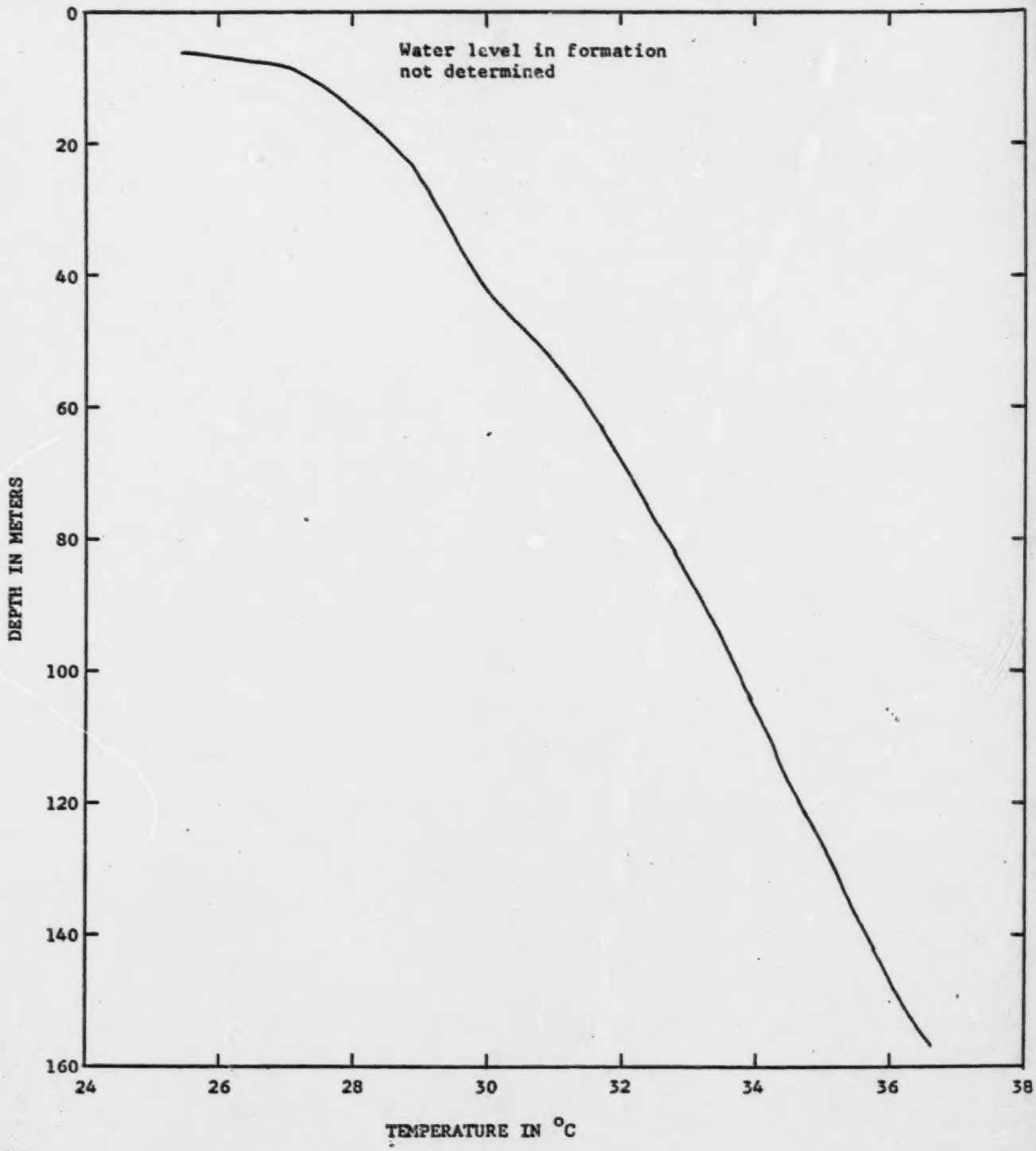

TABLE 1. -- Drillers' logs of wells

CV-1. 8S/9E-28E. 33°26'54"N. 116°03'32"W. Tomas Meyers estate. Alt -59 m (-195 ft.) Drilled by U.S. Geological Survey, 1978. Casing: CV-1H, 38 mm (1 1/2-in.) diam to 173.8 m no openings; CV-1P, 50 mm (2-in) diam with well point to 154.4 m. Water level above land surface in CV-1P, Nov, 1978. Maximum temperature 42.8°C at 173.8 m in CV-1H.

Materials	Thickness (meters)	Depth (meters)
Sand, gray, fine to medium, and gravel, angular, with thin layers buff silt	28	28
Clay, brown, and silt	4	32
Clay, very fine to fine, silty	9	41
Silt, and sand, very fine to fine, in alternating layers	9	50
Sand, very fine to medium, and silt	19	69
Sand, fine to coarse, and gravel	19	88
Sand, very fine to fine, with layers of light brown silt to clay	10	98
Silt, varicolored	1	99
Sand, fine to very coarse, with silt and clay	2	101
Sand, fine to very coarse	20	121
Silt and sand, very fine to fine, alternating layers, and some light brown clay	34	155

TABLE 1. -- Drillers' logs of wells (continued).

CV-2. 8S/9E-32H. 33°26'01". 116°03'38"W. Nicholaso Andrias.

Alt about -46 m (-150 ft). Drilled by U.S. Geological Survey, 1978.

Casing: 50 mm (2-in) diam with well point, to 142.7 m. Water level 5.5 m, Nov, 1978. Maximum temperature 47.5°C at 142 m.

Materials	Thickness (meters)	Depth (meters)
Sand, very fine to very coarse, and gravel, to very large pebble size	20	20
Clay, silty, brown	2	22
Sand, very fine to medium, and gravel to medium pebble size, with some layers brown silt and clay	56	78
Sand, fine to very coarse	18	96
Gravel and sand	9	105
Sand, very fine to fine, with some layers brown silt	19	124
Sand, medium to very coarse, and fine gravel. few layers silt	12	136
Sand, very fine to coarse, silty, and some fine gravel	18	154

TABLE 1. -- Drillers' logs of wells (continued).

CV-3. 8S/9E-20J. 33°27'44". 116°03'38"W. Porfirio Torro.

Alt about -69 m (-225 ft). Drilled by U.S. Geological Survey, 1978.

Casing: CV-3H, 38 mm (2-in) diam with well point, to 83.4 m. Water level above land surface in CV-3P, Oct 1978. Maximum temperature 39.2°C at 181 m.in CV-3H.

Materials	Thick-ness (meters)	Depth (meters)
Sand, very fine to fine, silty	22	22
Silt brown	1	23
Sand, very fine to fine, silty, little clay	10	33
Silt, with some very fine sand and brown clay	18	51
Silt and brown clay	2	53
Sand, very fine, with silt and brown clay	15	68
Silt and bron clay	18	86
Silt, alternating with clay	19	105
Silt	18	123
Silt, with few layers brown clay	33	156
Silt, and brown clay	24	180

TABLE 1. -- Drillers' logs of wells (continued).

CV-4. 8S/8E-10C. 33°27'16". 116°08'30"W. Kenji Sakamoto

Alt about -17 m (-55 ft). Drilled by U.S. Geological Survey, 1978.

Casing: 50 mm (2-in) diam with well point, to 162 m. Water level 28 m, Nov, 1978. Maximum temperature 36.2°C at 162 m.

Materials	Thickness (meters)	Depth (meters)
Sand, fine to very coarse, and gravel	9	9
Sand, very fine to fine, silty	5	14
Sand, fine to medium, and gravel	9	23
Sand, fine and very fine, silty, with brown clay	5	32
Sand, fine to coarse, and gravel	14	46
Sand, very fine to coarse, silty	13	59
Sand, very fine to coarse, silty, and gravel	11	70
Sand, very fine, silty	17	87
Sand, fine to very coarse	18	105
Sand, very fine to very coarse, and silt	14	119
Sand, fine to very coarse, and gravel	4	123
Sand, very fine to coarse, and silt	23	146
Sand, fine to coarse, and gravel; some silt layers	19	165
Silt, and sand, very fine to fine	3	168

TABLE 1. -- Drillers' logs of wells (continued).

CV-5. 8S/8E-12M. 33°29'29". 116°06'41"W. Gilbert Josund

Alt about -50 m (-165 ft). Drilled by U.S. Geological Survey, 1978.

Casing: 50 mm (2-in) diam with well point, to 158.5 m. Water level above land surface, Oct, 1978. Maximum temperature 32.9°C at 158.5 m.

Materials	Thick-ness (meters)	Depth (meters)
Silt	5	5
Sand, fine to very coarse	9	14
Sand, fine to very coarse, silty	9	23
Sand, fine to coarse, silty, some clay	4	27
Clay, brown, and silt	5	32
Silt, and brown clay	8	40
Sand, very fine. with silt and clay layers	30	70
Clay, brown, and silt	2	72
Silt, with very fine sand, little brown clay	22	94
Silt, and very fine sand	2	96
Sand, very fine, and silt	13	109
Clay, brown	1	110
Sand, very fine, with silt layers	9	119
Sand, silt, little gravel	4	123
Sand, very fine, with silt layers	13	136
Clay, brown, silty	2	138
Sand, very fine, with silt layers	7	145
Silt with sandy layers	3	148
Sand, very fine, with silt layers	7	155

TABLE 1. -- Drillers' logs of wells (continued).

CV-6. 8S/9E-18N. 33°28'13"N. 116°05'38"W. Russell Thibodo.

Alt about -55 m (-180 ft). Drilled by U.S. Geological Survey, 1978.

Casing: 38 mm (1 1/2-in) diam to 184.7 m, no openings. Maximum temperature 38.4°C at 184.7 m.

Materials	Thickness (meters)	Depth (meters)
Sand, very fine to fine, silty, some coarse, angular gravel. Gastropod fragments.	26	26
Silt, light brown	6	32
Sand, very fine to fine, silty	10	42
Sand, very fine to medium, alternating with silt. Gastropods	26	68
Sand, very fine to medium, few silt layers	30	98
Sand, very fine to fine	29	127
Silt and sand, some angular gravel	6	133
Sand, very fine to medium, some silt	16	149
Sand, very fine to medium, alternating with silt	36	185

TABLE 1. -- Drillers' logs of wells (continued).

CV-7. 8S/9E-19N. 33°27'20"N. 116°05'37"W. Charles Rennie.

Alt about -40 m (-130 ft). Drilled by U.S. Geological Survey, 1978.

Casing: 50 mm (2-in) diam with well point to 149 m. Water level 2 m, Sept, 1978. Maximum temperature 40.0°C at 148 m.

Materials	Thick-ness (meters)	Depth (meters)
Sand, fine to coarse, few silty layers	23	23
Clay and silt	1	24
Sand, very fine to medium, few silty layers	21	45
Sand, fine to medium	81	126
Sand, alternating with silt	11	137
Sand, silty, indurated or cemented	18	155

TABLE 1. -- Drillers' logs of wells (continued).

CV-8. 8S/9E-31A. 33°26'24"N. 116°04'45"W. Oasis Sanitary Landfill Alt about -32 m (-105 ft). Drilled by U.S. Geological Survey, 1978. Casing: 38 mm (1 1/2-in) diam to 120.7 m, no openings. Maximum temperature 37.7°C at 98 m (37.5°C at 120 m).

Materials	Thickness (meters)	Depth (meters)
Sand, fine to very coarse, and subangular to subrounded gravel	23	23
Sand, fine to very coarse, gravel, and little silty brown clay	18	41
Sand, fine to very coarse, silty, small amount gravel	5	46
Sand, fine to very coarse	4	50
Sand, fine to very coarse, stringers of brown clay	9	59
Sand, fine to very coarse, some gravel	5	64
Sand, fine to very coarse, and gravel, few stringers of brown clay	9	73
Sand, fine to very coarse, small amount of gravel	14	87
Sand, gravel, and few stringers brown clay	4	91
Sand, fine to very coase, and gravel	10	101
Sand, fine to very coarse, gravel, and few layers of brown clay	22	123

TABLE 1. -- Drillers' logs of wells (continued).

CV-9. 9S/9E-4M. 33°25'01"N. 116°02'57"W. Edward Kintano. Alt about -32 m (-105 ft). Drilled by U.S. Geological Survey, 1978. Casing: 50 mm (2-in) diam with well point to 148.5 m. Water level 22 m, Mar,1979. Maximum temperature 44.1°C at 148 m.

Materials	Thickness (meters)	Depth (meters)
Sand, fine to medium. Small gastropods	6	6
Sand, very fine to fine	12	18
Sand, very fine to fine, and brown silty clay	6	24
Silt, brown clayey, and very fine sand	13	37
Sand, very fine, and brown, clayey silt	12	49
Sand, very fine, brown silt, and gravel	12	61
Sand, fine to very coarse, small amount gravel	2	73
Sand, fine to very coarse, clayey silt, and gravel	12	85
Sand, very fine to very coarse, silty	13	98
Sand, fine to very coarse, few layers brown clay and silt	12	110
Sand, fine to very coarse	6	116
Sand, fine to very coarse, and very fine gravel	12	128
Sand, very fine to very coarse, silty, varicolored, "dirty"	12	140
Sand, very fine to very coarse, silty, and very fine to fine gravel	12	152
Sand, fine to very coarse, and subangular to subrounded gravel	7	159
Sand, fine to very coarse, gravel, and little brown clay	6	165

TABLE 1. -- Drillers' logs of wells (continued).

CV-10. 8S/9E-32H. 33°26'13"N. 116°03'39"W. Nicholasso Andrias.

Alt about -49 m (-162 ft). Drilled by U.S. Geological Survey, 1978.

Casing: 50 mm (2-in) diam with well point, to 161 m. Water level 3 m,

Mar,1979. Maximum temperature 47.3°C at 161 m.

Materials	Thick-ness (meters)	Depth (meters)
Sand, fine to coarse	20	20
Clay, brown, silty	3	23
Sand, fine to medium, some brown, silty clay	20	43
Sand, fine to medium, silty clay, and gravel	6	49
Sand, fine to coarse, and gravel to 25 mm	30	79
Sand, fine to very coarse, gravel, and clay	6	85
Sand, fine to coarse, silty, some gravel	13	98
Sand, fine to very coarse, and gravel	12	110
Sand, fine to coarse	6	116
Sand, fine to coarse, and gravel	12	128
Sand, fine to coarse, gravel, little silty clay	6	134
Sand, fine to coarse, and gravel	18	152
Sand, fine to coarse, gravel, and silty clay	10	162

TABLE 1. -- Drillers' logs of wells (continued).

CV-11. 9S/9E-16D. 33°23'38"N. 116°02'58"W. Alt about -56 m (-185 ft). Drilled by U.S. Geological Survey, 1979. Casing: 38 mm (1 1/2-in) diam to 155.5 m, no openings. Maximum temperature 36.7°C at 155.5 m.

Materials	Thickness (meters)	Depth (meters)
Sand, fine to very coarse, silty	6	6
Sand, fine to coarse, and brown, silty clay	6	12
Silt, brown, and clay	6	18
Sand, fine to very coarse, and silty clay	12	30
Sand, fine to very coarse	7	37
Silt, brown clay, and very fine sand	18	55
Sand, very fine to fine, and clayey silt	6	61
Silt, with very fine to coarse sand	18	74
Sand, very fine to very coarse, gray to brown silt and clay	6	85
Sand, fine to coarse, and very fine gravel silty	19	104
Sand, very fine to coarse, silty	6	110
Sand, very fine to coarse, and gray silt	12	122
Sand, very fine to coarse, gray silt, and brown clay	6	128
Sand, very fine to medium, gray silt, and yellow silt	12	140

TABLE 2.-- Chemical analyses of water from wells

Site number (CV-)	Unit	1	2	3	4	5	7	9	10
Sampling date: day, June 1979		13	13	12	14	12	14	13	13
Depth of well screen, meters		154	142	83	162	158	149	148	161
Alkalinity, total, as $CaCO_3$	mg/L	110	55	180	260	56	110	25	37
Arsenic	µg/L	1	2	40	3	70	2	2	1
Boron	µg/L	5,500	470	180	300	160	440	340	480
Calcium	mg/L	730	8.7	0.8	200	2.7	11	38	18
Carbon dioxide	mg/L	0.0	0.0	0.0	0.0	0.2	0.3	0.0	0.1
Chloride	mg/L	4,600	270	13	240	9.2	260	340	380
Fluoride	mg/L	1.1	2.0	4.3	2.3	4.0	2.6	3.4	2.6
Hardness, total	mg/L	1,800	50	2	500	7	160	190	200
Iron	µg/L	60	10	70	30	20	10	20	10
Lithium	µg/L	900	180	8	150	8	170	170	170
Magnesium	mg/L	0.8	6.9	0.0	0.2	0.8	31	24	37
Mercury	µg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nitrate + nitrite, as N	mg/L	0.09	0.00	0.00	4.5	0.00	0.00	0.01	0.00
pH, field	--	10.5	10.0	10.0	10.8	8.7	8.8	9.1	8.7
Phosphate, ortho, as P	mg/L	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
Potassium	mg/L	24	21	1.5	24	0.4	20	20	18
Residue, calculated sum	mg/L	10,400	1,050	241	1,560	215	1,180	1,470	1,600
Silica	mg/L	0.1	0.2	8.8	5.8	17	0.6	0.2	0.0
Sodium	mg/L	3,000	350	96	340	71	350	440	510
Specific conductance, field	*	15,300	1,690	550	3,000	360	2,000	2,580	2,600
Sulfate	mg/L	2,000	360	7.5	570	77	440	590	610
Temperature, water	°C	26.5	37.0	29.5	29.0	26.0	32.0	34.5	36.0
Zinc	µg/L	300	140	140	350	10	10	10	10

Analyses by U.S. Geological Survey Central Laboratory, Lakewood, Colorado
Constituents dissolved, except where noted as total
mg/L = milligrams/liter. µg/L = micrograms/liter. * = micromhos/cm @ 25°C